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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/598,680

05/15/2007

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EXAMINER

DOUGHERTY, THOMAS M

ART UNIT

PAPER NUMBER

2834

MAIL DATE

DELIVERY MODE

12/09/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/598,680	Applicant(s) KONDO ET AL.	
	Examiner Thomas M. Dougherty	Art Unit 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 4-18, 23 and 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 19 and 24-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 September 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the glass layer formed between the piezoelectric layer and internal electrodes must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-3 and 19-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The lack of description concerning the glass layer now claimed renders the claims indefinite. The specification never explicitly mentions the term "glass layer". Page 90 indicates that the intermediated layer 70 may be glass but that this has bad results, explicitly stating that this: "acts as the start point of destruction". Page 105 notes a "glass-rich layer" but this is formed on the external electrode. Pages 112 and 113 as well as other pages note that the glass may be combined with an electrode material to form an electrode but that electrode is external. Other pages note the glass paste formed by silver, glass and a binder but it was not found in the specification that there exists a specific glass layer formed between the piezoelectric layer and internal electrodes.

The Applicants provide antecedent basis for the existence of a glass layer(s) between a piezoelectric layer(s) and an internal electrode(s) in the specification at the places cited in the response to the first office action on the merits. The Examiner recommends adding a figure to show the glass layer placed between the piezoelectric layer or layers and the internal electrodes. Add language in the specification referring to the new figure and point out each feature of the figure. This will not be regarded as new matter. Depending on how the structure is then understood may result in a new search

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being necessary. Note that without such a figure a routineer in the art would not clearly know whether or not he would be infringing the Applicants' patent were it to issue.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 19, 20, 22, 25, 26, 29 and 32-36 are rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Kawamoto (JP 2003-318458) in view of Ochi (JP 61-182284). Kawamoto shows (figs. 1-4) a multi-layer piezoelectric element comprising: a stack (1a) formed by stacking at least one piezoelectric layer (1) and a plurality of internal electrodes (2) consisting of first and second internal electrodes alternately one on another; a first external electrode (4) which is formed on a first side face of the stack (1a) and is connected to the first internal electrode (2); and a second external electrode (also 4) which is formed on a second side face of the stack (1a) and is connected to the second internal electrode (also 2), wherein a bonding strength between the piezoelectric layer and the internal electrode is controlled to be weaker than a bending strength of the piezoelectric layer

The bonding strength between the piezoelectric layer and the internal electrode. Again, note that Kawamoto shows the claimed structure.

A bonding strength between the first external electrode and the internal electrode and a bonding strength between the second external electrode and the internal

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electrode are larger than the bonding strength between the piezoelectric layer and the internal electrode.

A ratio (α_1/α_2) is not less than 0.9 and is below 1 (where α_1 is a thermal expansion coefficient of the metal that constitutes the internal electrode and α_2 is a thermal expansion coefficient of the metal that constitutes the external electrode). Kawamoto shows an intermediate layer (3) having a composition different from the internal electrode (2) and the external electrode (4) in a junction between the internal electrode (2) and the external electrode (4).

A thermal expansion coefficient α_3 of the intermediate layer satisfy a relation $\alpha_1 < \alpha_3 < \alpha_2$.

The internal electrodes (2) are exposed on all side faces of the stack. See fig. 1.

A metal compound in the internal electrode includes a metal of group 8 to 10 and/or a metal of group 11 as a main component. See paragraph 46.

The group 8 to group 10 metal is at least one kind selected from a group consisting of Ni, Pt, Pd, Rh, Ir, Ru and Os, and the group 11 metal is at least one kind selected from a group consisting of Cu, Ag and Au.

The group 8 to group 10 metal is at least one kind selected from a group consisting of Pt and Pd, and the group 11 metal is at least one kind selected from a group consisting of Ag and Au.

An inorganic composition which is different from a metallic compound of the internal electrode is added together with the metallic compound in the internal electrode. See paragraph 46.

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A main component of the inorganic composition is perovskite type oxide consisting of $\text{PbZrO}_3\text{-PbTiO}_3$.

A main component of the piezoelectric layer is a perovskite type oxide.

A main component of the piezoelectric layer is the perovskite type oxide consisting of $\text{PbZrO}_3\text{-PbTiO}_3$.

Ends of the first internal electrodes (2) are exposed on one side face of the stack while grooves (3) are formed on said one side face so as to locate between the second internal electrodes (2) and the first external electrodes (4) wherein ends of the second internal electrodes (2) are exposed on other side face of the stack (1a) while grooves (3) are formed on said one side face so as to locate between the first internal electrodes (2) and the first external electrodes (4), wherein each of the grooves (3) is filled with an insulating material (see paragraph 49) that has Young's modulus lower than that of the piezoelectric material (1).

Kawamoto doesn't show glass.

Ochi shows (e.g. figs. 3, 6) use of glass (27, 28) in contact with his piezoelectric and electrode layers.

He doesn't show placement internally of his glass.

It would have been obvious to one having ordinary skill in the art to employ a glass layer between the piezoelectric and internal electrodes in the device of Kawamoto at the time of his invention, as such use is shown by Ochi for insulation, thus such use

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would help prevent electrical shorts in the device, particularly if ends of the internal electrodes were covered.

Claims 21, 24, 27, 30 and 31 are rejected, as these are best understood. under 35 U.S.C. 103(a) as being unpatentable over Kawamoto (JP 2003-318458) in view of Ochi (JP 61-182284). Given the combined invention of Kawamoto and Ochi as noted above, it is not clear that there is an intermediate layer composed of a metal that constitutes the internal electrode and a metal that constitutes the external electrode and wherein a metal compound that constitutes the internal electrodes include a main component of the metal compound that constitutes the external electrodes not less than 80% by weight and less than 100% by weight. It is not known whether a proportion M1 (% by weight) of the group 8 to group 10 metal and a proportion M2 (% by weight) of the group 11 of the internal electrode satisfy the relations $0 < M1 \leq 15$, $85 \leq M2 < 100$ and $M1 + M2 = 100$. The group 8 to group 10 metal is not noted as Ni. The group 11 metal is not noted as Cu.

It would have been obvious to a routineer in the art to employ a metal for electrode components in the device of Kawamoto, including an intermediate layer, because metals are conductive and thus necessary for the Kawamoto invention. By adjusting the metal content, the conductivity can further be controlled.

Regarding the use of Ni or Cu, it would have been obvious to one of ordinary skill in the art to employ either Ni or Cu or both, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 123 USPQ 416.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Direct inquiry to Examiner Dougherty at (571) 272-2022.

/T. M. D./

tmd

December 5, 2008

/Thomas M. Dougherty/

Primary Examiner, Art Unit 2834

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